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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,931	07/21/2006	Dong-Hyun Ryu	5731-102 US	8187

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PRINCETON, NJ 08540

EXAMINER
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BARROW, AMANDA J

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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03/30/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/586,931	<b>Applicant(s)</b> RYU ET AL.	
	<b>Examiner</b> AMANDA BARROW	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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### **DETAILED ACTION**

1. The Applicant's amendment filed on 11/13/09 was received. Claims 1-5 were amended. Claims 6-9 were added.

2. The texts of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on 5/13/2009.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1 and 5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 5 both recite that the liquid electrolyte comprises a "glyme solvent" which is not found anywhere in the specification. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 6, 8 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhao et al. (US Patent Application 2001/0033971 A1) (hereinafter “Zhao”) and evidenced by Latturner et al. (US Patent Application 2010/0047161).

.Regarding claim 1, Zhao teaches a nonaqueous electrolyte battery in which the negative electrode can be made of alkali metals such as sodium (paragraph 59). It is well known that sodium metal is a solid and Zhao further gives evidence of this by teaching that the negative electrode is constructed by pressing the metal or the alloy to a current-collecting material (paragraph 60).

Zhao teaches a solid polycarbon sulfide material to be used as an active material for a positive electrode in a battery which consists of two elements, namely carbon and sulfur (see paragraphs 14, 30 and 31). Furthermore, Zhao teaches that the positive electrode may comprise a nickel compound as a constituent including nickel sulfides such as NiS, Ni<sub>2</sub>S<sub>2</sub>, NiS<sub>2</sub> and the like, and that these compounds also act as an active material for the positive electrode (paragraph 56). Both the nickel sulfide compounds and the polycarbon sulfide material are solid materials and Zhao teaches the process of forming the positive electrode which is solid (paragraph 58).

Zhao teaches that a liquid electrolyte may be used and that an electrolyte salt is dissolved in a nonaqueous solvent (paragraph 62). The electrolyte salt includes sodium salts (paragraphs 66 and 67). Zhao teaches that 1,2-dimethoxyethane (also referred to as DME or dimethoxyethane) can be used as the nonaqueous solvent (paragraph 64) which is a “glyme

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solvent.” This is evidenced by Latturner who teaches that “glymes” is a generic term that can be used to refer to monoglyme which is dimethoxyethane (paragraph 61).

Regarding claim 2, Zhao teaches that the sodium of the negative electrode can be sodium metal (paragraph 59).

Regarding claim 3, Zhao teaches that the sulfur used for the positive electrode begins as an alkali metal sulfide and sulfur (paragraph 30) and then is formed into polycarbon sulfide (abstract) which is an organic sulfur compound.

Regarding claim 4, Zhao teaches that preferable examples of the electrolyte salt to be dissolved in the solvent component includes sodium salts of fluorine-containing compounds such as trifluormethane sulfonate (paragraph 66).

Regarding claim 6, Zhao teaches that the positive electrode comprises sulfur (see the rejection of claim 1), a conducting aid and a binder (paragraph 53).

Regarding claim 8, Zhao teaches that the conducting aid can be a carbonaceous material such as graphite and carbon black (paragraph 53).

Regarding claim 9, Zhao teaches that the sulfur of the positive electrode may be NiS (paragraph 56).

### ***Claim Rejections - 35 USC § 103***

7. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Zhao et al. in view of Kamino on claims 1- 5 are withdrawn as the claims have been amended.

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8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al. as evidenced by Lauttner as applied to claims 1-4, 6, 8 and 9 above, and further in view of Wariishi (US Patent Application 2003/0219647).

Regarding claim 5, Zhao teaches that 1,2-dimethoxyethane (also referred to as DME or dimethoxyethane) can be used as the nonaqueous solvent (paragraph 64) which is a “glyme solvent.” This is evidenced by Latturmer who teaches that “glymes” is a generic term that can be used to refer to monoglyme which is dimethoxyethane (paragraph 61).

Zhao does not disclose the solvents claimed; however, Wariishi teaches liquid electrolytes for batteries and teaches the use of either dimethoxyethane or polyethylene glycol dimethyl ether (paragraph 41). Dimethoxyethane and polyethylene glycol dimethyl ether are considered functionally equivalent electrolyte solvents. Therefore, it would have been obvious to one of ordinary skill in the art to substitute polyethylene glycol dimethyl ether for dimethoxyethane.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al. as evidenced by Lauttner as applied to claims 1-4, 6, 8 and 9 above, and further in view of Choi (US Patent Application 2002/0037457).

Regarding claim 7, Zhao teaches that the positive electrode may include a binder and teaches that polytetrafluoroethylene may be used (paragraphs 53 and 55). Zhao does not teach polyethylene oxide as the binder to be used; however Choi discloses an electrode in which the binder can be selected from polytetrafluoroethylene and polyethylene oxide (claim 6).

Polytetrafluoroethylene and polyethylene oxide are equivalent binding materials in electrodes.

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Therefore, it would have been obvious to a person of ordinary skill in the art to substitute polyethylene oxide for polytetrafluoroethylene.

***Response to Arguments***

10. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

*Applicant's remaining principal arguments are*

*(a) Amended claim 1 recites a liquid electrolyte comprising a glyme solvent which is disclosed neither by Zhao nor Kamino.*

*(b) The CS compound in Zhao is distinct from the sulfur used for the solid positive electrode in amended claim 1 in terms of its chemical characteristics.*

*(c) Zhao does not teach that the negative electrode including sodium can be composed in a solid form.*

In response to Applicant's arguments, please consider the following comments.

(a) Zhao teaches that a liquid electrolyte may be used and that an electrolyte salt is dissolved in a nonaqueous solvent (paragraph 62). The electrolyte salt includes sodium salts (paragraphs 66 and 67). Zhao teaches that 1,2-dimethoxyethane (also referred to as DME or dimethoxyethane) can be used as the nonaqueous solvent (paragraph 64) which is a "glyme solvent." This is evidenced by Latturmer who teaches that "glymes" is a generic term that can be used to refer to monoglyme which is dimethoxyethane (paragraph 61).

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(b) No chemical characteristics of the sulfur compound are listed in claim 1 to distinguish it from the sulfur used by Zhao. Claim 1 only recites a solid positive electrode comprising sulfur which is taught by Zhao.

(c) Zhao teaches a nonaqueous electrolyte battery in which the negative electrode can be made of alkali metals such as sodium (paragraph 59). It is well known that sodium metal is a solid and Zhao further gives evidence of this by teaching that the negative electrode is constructed by pressing the metal or the alloy to a current-collecting material (paragraph 60). Thus, the electrode is a solid electrode that comprises sodium as recited in the claim.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 7:30am-5pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AMANDA BARROW/  
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795